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ABSTRACT

The first of two volumes, this report provides a brief description of a 1987 conference on distance education together with the papers presented by three of the four keynote speakers; presentation notes are included for the fourth presentation. It is noted that, in addition to these papers, the conference included 41 informational sessions and application workshops. The keynote papers are: (1) "Corporate View of the Evaluation of Distance Learning," in which Lana H. Wirtz uses the experiences of the Aetna Life and Casualty Company in her examination of issues involved in the evaluation of distance education from a business-oriented perspective; (2) "Examining Future Telecommunications Technologies," in which Larry Dickerson considers how present and future technologies can be used in distance education; (3) "Critical Questions in the Evaluation of Distance Education," in which Peter J. Dirr considers various issues and approaches that might frame the research used to evaluate distance education programs, including an appendix listing the guidelines used by the Annenberg/Corporation for Public Broadcasting Project for the formative evaluation of materials development projects; and (4) "Evaluation of Broadcasting in Education" (presentation notes only), in which A. W. (Tony) Bates examines the design implications of using television as the distance education medium. Forms are included to order either audiotapes of all four presentations and/or a videotape of the last presentation. (EW)

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## Third Annual Conference on Teaching at a Distance:

# Evaluation of Teaching/Learning at a Distance

**Madison, Wisconsin**
**August 3-6, 1987**

**VOLUME I**

**KEYNOTE ADDRESSES**

*Sponsored by:*

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Third Annual Conference on Teaching at a Distance

EVALUATION OF TEACHING/LEARNING AT A DISTANCE

Madison, Wisconsin
August 3-6, 1987

The Third Annual Conference on Teaching at a Distance was held in Madison on August 3-6, 1987. The conference was attended by 225 participants from throughout the United States and Canada. Highlights of the program included four keynote addresses and forty-one informational sessions and application workshops. The sessions and workshops were divided into four strands: evaluation of distance teaching/learning, policy questions, support systems, and teaching strategies.

This two-volume report contains material presented at the conference. In Volume I are the four keynote addresses. In Volume II are twenty-one papers and abstracts presented in the informational sessions. The material provides a good overview of the kinds of issues, problems, solutions, and opportunities discussed at the conference.

Tape recordings of the keynote presentations are available for purchase. Audio tapes may be ordered from William Braun, Instructional Communications Systems, University of Wisconsin-Extension, Old Radio Hall, 975 Observatory Drive, Madison, WI 53706; (608) 262-4342.

An audiocassette and videotape package is available for the keynote address by Tony Bates. The videotape (1/2-inch VHS) contains the video material used by Dr. Bates in his presentation. The package can be ordered from Terry Gibson, Associate Professor, University of Wisconsin, 432 N. Lake Street, Madison, WI 53706; (608) 262-4877.

For your convenience, forms to order the keynote recordings are provided at the back of Volume I.

We hope the conference material will be useful to you.

Terry Gibson, Ph.D.
Associate Professor
University of Wisconsin-Madison

VOLUME I

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# Keynote Address

## CORPORATE VIEW OF THE EVALUATION OF DISTANCE LEARNING

Lana H. Wertz
Aetna Life and Casualty
Keynote Address
August 3, 1987

Thank you very much. I feel quite privileged to be a part of this important and timely conference, and to be associated with such an accomplished group of presenters and session leaders.

I'd like to use the time available this morning to do a couple of things. After some introductory remarks, I'd like to provide a very broad brush look at the scope and nature of distance education in the corporate sector. My purpose will not be to survey the field, or even to highlight truly exemplary activities, but to suggest the range of such activities.

Then, I'll turn to the matter of course or program evaluation. I'll attempt to depict the organizational environment in which discussions pertaining to distance education are typically rendered. I'll also provide a capsule summary of one of our recent evaluations of a remotely delivered program. Hopefully, this part of the presentation will help you to more fully appreciate the context of evaluation as it is experienced by educators who work in organizations that do not count education among their primary reasons for being.

I'll close with a brief look at where we're going with distance education, and suggest some of the evaluation issues implied by this direction.

The Aetna Life and Casualty Company recently reformulated their corporate mission. This mission can be summarized with the following phrase: "To be the best in the business." Far from being a slogan, our executives are prepared to commit the resources necessary to accomplish this mission.

At the same time, however, our executives realize that the commitment of resources will be a necessary, though not sufficient, condition for our ultimate success. To get where we want to go, we will have to effectively deal with four key challenges.

The first is an uncertain business environment. Aetna, you see is in a transition from being an insurance company to being a financial services company. Just what constitutes the financial services industry, or exactly who one's competitors are, is not really clear. What is clear, however, is that an increasing premium will be placed on our ability to adapt and to innovate--two traits, I might add, that have never exactly characterized the insurance industry.

The second challenge concerns the rapid introduction to technology. Our ability to quickly plan, build, and run information systems will be a critical factor in our long term success. At the same time, we must effectively manage the human resource implications of large scale conversions from manual to electronic modes of information processing.

Third, we must effectively cope with an increasingly diverse work force. Here I'm referring to diversity not just in terms of race, ethnicity, and cultural identification, but also in terms of value systems and basic orientation toward work. We must be able to accommodate this diversity and still promote unity of purpose within the corporation.

The fourth challenge emerges from our growing presence in the international marketplace. More and more we will need people who can think globally and act locally. When our managers make a business decision they will have to factor in ideas and trends that are important outside the United States. Put another way, we really can't look to our experiences in Des Moines, or Detroit, or Hartford to guide our operations in Hong Kong or for that matter, Toronto.

Our business leaders also recognize that a proactive human resources development posture is essential to our ability to successfully confront these challenges. And it is out of this recognition that the company established the Aetna Institute for Corporate Education.

Simply put, the mission of the Aetna Institute is to meet business needs through education and training. It discharges this mission in a number of ways. First, it plans and conducts corporate-wide programs in the areas of executive, management and supervisory education; individual skills development; and information systems education for both systems professionals and end-users. Let me show you a videotape which summarizes what we do.

(Show Tape)

Our current progress in these areas include 120 classroom-based, and 175 self-paced courses. Combined, they represent over 60,000 student days of instruction each year.

Second, the Institute manages the Company's continuing and professional education programs. These include opportunities provided through our tuition assistance program; on-site programs leading to the general equivalency diploma, associate degree, bachelor degree and MBA; as well as a variety of professional credentialling activities.

Third, the Institute houses our Corporate Information Center, which is designed to meet the needs of an informational, rather than educational nature. The Center staff responds to over 25,000 requests for information each year.

Finally, the Institute provides consultation and technical assistance to the HR Departments of the Company's five operating divisions, as well as to the various line departments within these divisions that may conduct education or training-related activities. Our consulting staff has particular expertise in the areas of instructional design, media selection, and program evaluation.

Having said all of this about Aetna and the Aetna Institute, I think we should remind ourselves of a couple of important points about distance teaching and learning in U.S. corporations in general.

First, the challenge of how to provide quality instruction, at the lowest possible cost, to employees at remote sites confronts many American firms. Providing access to the resources of the Aetna Institute to the 30,000 Aetna employees who do not work in the Hartford area is, for example, one of the top objectives in our Corporate Human Resources Department's annual operating and long-range strategic plans. But for the majority of business enterprises, distance education is a non-issue. We should remember that the "average" company has fewer than 50 employees, and operates in a single location.

The second point to bear in mind is that it's probably still fair to characterize distance education in the corporate world as a predominately "low-tech" affair. The corporate equivalent of the "correspondence course"--print materials sent through the mail--has until very recently, been synonymous with "distance education."

While on this subject, it's interesting to equate "distance education" with the technology used to deliver it. My staff is constantly reminded by the President of the Aetna Institute to avoid the mistake of defining what we do by reference to our techniques and instrumentation. The change in the name of one of the units of the Institute from the Educational Technology Unit to the Access Unit is an explicit tribute to the important distinction between end and means.

The final point I want to make is that the education and training function in our larger firms is by no means a monolithic enterprise. I know of few instances where the corporate human resource department holds responsibility for all of the education and training that goes on in an entire company. As I suggested a moment ago, it's common for operating divisions to maintain their own training staffs. And even within divisions, we find training functions associated with different line and staff departments--for example, information systems, engineering, product development, and marketing. The important point in all of this, is that a good share of what goes on in the name of education is neither planned, implemented, or financed by educators or human resource experts. At Aetna for example, our entire network of field operations falls under the administrative control of the field management departments of our five operating divisions. This means that the educators in our Corporate Human Resource Department serve as consultants and contractors to these operating entities. And frankly, the executives who manage these operations don't spend a lot of their collective energies thinking about how they're going to deliver education and training to the folks in Des Moines. They spend even less wondering how they might evaluate it. Obviously, when training is to be done, these executives want it "done well"--but "done well" may mean something different to an expert in underwriting or data processing systems than it does to our expert in adult learning, instructional design, or educational evaluation.

So what's happening in distance education in U.S. companies? For our purposes, let's approach this question from the standpoint of the needs that distance education is intended to address.

These needs typically fall into three broad categories--what we might term occupational, operations, and developmental.

Many firms have to provide relatively extensive occupational training to newly hired professional and technical employees. For example, less than five percent of the people we hire for entry-level underwriting, marketing, engineering, claim, and premium audit positions in our field offices have either formal preparation or practical experience in the areas of risk and insurance. Each year upwards of 28 weeks of occupational training must be provided to hundreds of new hires spread across 70 or 80 different branch locations. Currently, we bring all of these employees into Hartford for four or five weeks of training; the remaining 23 or 24 weeks of their program is pursued in the field through guided self-study.

Changes in operations present the second type of need. This need would accompany, for example, the introduction of new work processes or procedures, new products or services, or as is often the case, a combination of these. This year, for instance, our Commercial Insurance Division will be introducing two new insurance products, as well as an entirely new way of processing the transactions associated with these products. We're talking training and retraining on a large scale--literally thousands of employees and agents in scores of different locations across the country. Obviously, we can't bring everyone to Hartford. And sending out the training squads to conduct week-long sessions in a couple of hundred different sites tends to be somewhat costly. Moreover, when you've got an office that is processing over a million policy transactions a year, the idea of calling time-out for a week of training doesn't resonate too well with the field management department!

It's for these reasons that the new departments in delivering technologies have found their widest application in the area of operational training. Both the need and the numbers are there.

The third need for instruction involves employee career or professional development. This might include generic skills training in such areas as selling techniques, business writing, effective supervision, end user PC training, and so forth. It may also include continuing professional education, and education intended to affect the attitudes, dispositions, or motives of employees.

It is in this area that we find the greatest use of self-paced education as well as the employee tuition assistance programs. Nonetheless employee development needs and expectations always seem to stay well ahead of our capacity to respond.

As I look over the distance learning landscape--or at least that part that falls within the purview of the private sector--I'm left with the impression that we're at a critical juncture. That in many ways we're at the same place today with respect to the new delivery technologies as we were 15 years ago when we came upon the idea of distributing education like we did data--through mainframe computer networks. We are awed by the potential of what could be done, but limited by our ability to do it. And I think this at least partly explains why distance education in the private sector today has such a long way to go--why we see a misapplication of technology, a violation of adult learning principles, or a poorly conceived design much more often than we see

the dramatic success stories of the kind showcased in the literature. Just as we once occupied ourselves with transferring narrative from textbooks to CRT screens, we too often find ourselves setting up the video camera in the back of the classroom so that those folks in Des Moines can literally observe what went on in a Hartford training session.

But isn't this, after all, what course and program evaluation can help protect from? From us having to relive some of the less enlightened moments from our collective pasts? In my view, this alone would be a tremendously valuable service.

But the evaluation function has the potential of providing even more--in the way of helping American business discharge it's education and training responsibilities in the most effective and efficient way.

On the other hand, the evaluation function might fail to alert us of past mistakes, either because it is unable to accumulate and synthesize what we've learned, or because it's unable to communicate this knowledge to those who would most benefit from knowing.

In my judgment, the relevance of the evaluation function in a business organization hinges not on the technical expertise of the evaluator--although this is obviously important, but on the evaluator's understanding of the environment in which he or she must work. Let me be more specific. As I suggested earlier, the availability of new delivery systems has opened up vast new opportunities for meeting the needs of the distant learner. More than at any time, we're confronted with difficult decisions as to how to put our education and training dollars to their best use. Our evaluators must understand the nature of this decision process in order to serve it.

What is the nature of this decision process in the corporate setting?

First and foremost, it is a process--a process that is shaped as much by bureaucratic exigency and political bargaining as by analytical reasoning. Consequently, decisions are seldom "made" in the conventional sense. Instead, they are usually "rendered"--they emerge from the decision process.

Since most decisions regarding the allocation of training resources are not inherently analytical in nature, information deemed most useful to those who are party to the process will come in many forms. Trusted advice and counsel, the results of negotiations, expert testimony, and organizational custom will often take a place along side the findings of applied social science research as valued inputs to the overall process. The critical point here is that social science information enjoys no inherently privileged position among these various experts. This means that adherence to the disciplinary criteria used to establish the truth or certainty of evaluation findings--for example, accuracy, reliability, and validity--become necessary, but by no means sufficient to assure their value. Education findings must meet additional criteria imposed by the decision-rendering process. They must also be relevant, credible, timely, and understandable.

If this characterization is at all accurate, the charter for the evaluation function in the corporate setting becomes clear: It must be value or utility driven.

What does this mean?

For one thing, we have to get real good at identifying the market for evaluation information. By "market," I don't mean simply the general audience for the findings, or the specific individual who will receive the evaluation report. I mean the person or persons who have a genuine interest in the evaluation, and a stake in the information it will yield.

Second, it's critical that we identify and focus the relevant evaluation question or questions. This means that we've got to shake down the purpose of the evaluation, establish how the findings will be used, and determine whether "the benefit of knowing" something will exceed "the cost of finding out." This is an interactive and often tentative process involving both clients and evaluators.

Third, and this is closely related to the need to focus the evaluation question, we must work to clarify the goals or purposes of the activity that we intend to evaluate. Again, the overriding issue is what information is needed by whom, and not whether the goals outlined in the activity's documentation are correctly written, measurable, bounded, and so forth. There may, in fact, be multiple goals--both expressed and implied, explicit and implicit. Our evaluators must give priority attention to feretting out the central evaluation issues--the issues the clients care about.

It's only after we've identified our clients and clarified their information needs can we take up the matters of design and methodology. And more often than not, form will follow function in the truest sense.

As a consequence of this orientation, our evaluations seem to fit into a three dimensional framework

One dimension is client. Clients may be "policymakers"--that is, managers or executives. They may be program or project administrators, or instructional designers. Often, there is more than one client for a given evaluation.

The second dimension is the stage of the activity's maturity--whether, for example, the average project being evaluated can be considered a pilot or prototype, or an established and stable program.

The third dimension is focus of inquiry--whether we will focus on program implementation--that is, inputs and process, or program outcomes. If the focus is to be on outcomes, we might concentrate on the learner's reaction to the education experience; the degree of learning that takes place; the extent to which the learner applies new knowledge or skills on the job; or whether this application leads to improved individual or group productivity.

As you might suspect, our evaluations are going to take a wide variety of different forms. In fact, many would be more accurately described as monitoring, survey research, documentation, or investigative journalism rather than evaluation per se. For example, in the case of established occupational training programs, our clients tend to be middle managers who are looking for assurance that things are proceeding as planned--that the program is being faithfully implemented, and that the audience is reacting favorably to different program components. Consequently, we may employ a combination of observation, interview, and survey techniques to provide this information.

In the case of a "high stakes" training program, such as that involved with the introduction of the new field office data processing system that I described earlier, we're going to spend most of our energies on "up-front" activities. These activities would include feasibility studies and formative evaluation. When it comes to feasibility studies, those who will ultimately decide on a general training design and delivery system usually have much more information as to the costs associated with various alternatives, than the likely effectiveness of these alternatives. And the reality is that they will accept much wider estimates of probable effectiveness than they will of probable cost. So this is one place where the input of our evaluation staff can be critical. The second place is after a general design and delivery system has been selected. We can do much to influence the ultimate shape of the instructional design, and also help to organize pilot studies that will produce interpretable results. Once these organizational training programs are implemented, the die is essentially cast. Other than to monitor implementation, our role is one of trying to learn from the overall experience, so that we can accumulate and synthesize knowledge, and thereby contribute to the continued improvement of these programs over time.

Seldom, however, are we able to conduct the very careful research required to fully understand the interactions between learner characteristics, instructional methodologies, and delivery media. Far more often, we search out evidence of correlations, rather than proof of causation. We attempt to generalize findings across programs and learner populations much more often than we attempt to pinpoint the independent influences of factors which contribute to the observed outcome of an isolated event.

Clearly, the results of experimental and some of the more sophisticated quasi-experimental research models are of value to us. And it is for this reason that we have a genuine interest in the work of many of you and your colleagues.

Let me offer a capsule description of one of our more recent evaluations of a distance education program. I think it will help to illustrate some of the observations that I've shared thus far.

Within Aetna, as within many firms, there is a real need to help employees develop their written communications skills.

It was in response to this need that the Aetna Institute set out to produce a business writing telecourse that would be made available to the 13 locations across the country that are currently tied into our direct broadcast satellite system. Although we had previously used DBS to deliver numerous informational and educational programs to the field, we had never before attempted to offer a course as inherently challenging as business writing through the medium.

Briefly, the one way video, two way audio telecourse was a special adaptation of our traditional classroom. It was broadcast in three two-hour segments to 350 enrollees. The enrollees were required to submit a writing sample prior to the course, complete practice assignments between the sessions, and submit a completed writing exercise to our home office instructors at the conclusion of the course.

In the interest of time, I won't recount how our evaluations contributed to decisions made prior to the first broadcast. Instead, I'll try to portray what amounted to a multi-faceted evaluation, which attempted to respond to the information needs of a variety of different clients or audiences.

Our first clients were the course instructor and the educational media consultant who co-designed the course. In the beginning, their concerns were largely formative in nature. Was the pacing of the presentation correct? Were the graphics legible? Were students following along in their course guides? Were they tracking the instruction? We were able to provide this kind of in-process feedback by having observers in a closed-circuit viewing room at the Institute, and one of our evaluators on-site in one of the field offices. We also held intensive de-briefings with the instructors following each session.

The manager of our access unit, who was responsible for the overall program, shared many of these process-related concerns. In addition, she was especially interested in how the learners and the field office training coordinators reacted to the program. For example, was the instructor perceived as practical and useful? She was also interested in how this perception was influenced by site-specific factors, such as the number of students participating in a given location, the physical arrangement of the room, and the kind of equipment that was used to receive the broadcast.

This information was gathered by end-of session questionnaires.

A third set of clients included upper management from the operating divisions field management departments. As it turns out, their divisions were in the process of deciding whether to expand the DBS system to additional sites and thus increase access to underserved locations. Consequently, they were looking for information that would presumably "build a case" for expansion. Among other things, they wanted detailed breakdown of enrollees by field site, department, job class, and so forth. They also wanted to know whether the general managers of the 13 field offices that received the broadcast thought that the course was of value to their employees, and whether they felt that this method of delivering instruction made sense from a business operations standpoint. This information was gathered partly by questionnaire, and partly by interview.

Finally, we had a fourth set of clients who were interested primarily in information regarding outcomes. Did the course result in improved writing skills? And were the results comparable to those observed in the classroom setting? Importantly, the real issue here was not whether the telecourse "worked." It's success was assured up-front during the needs analysis and design stages. The real issue was efficiency rather than effectiveness. Would the tightly designed connections between program inputs and expected learning outcomes be adversely affected by the delivery medium? Or more accurately, would these connections be adversely affected by the delivery medium and the type of learning environment that attends this medium.

Here's where we had to seek evidence rather than proof. And it was through a combination of methods that we were able to at least partially address this evaluation question. That is, an analysis of the post-course writing assignments, a comparison of these results with those of our classroom course,

and a review of both post-course questionnaires and on-site observations, all helped us to piece together the answers. And by the way, the telecourse did "work"!

So that's an insider's look at how evaluation of distance education courses and programs is being played out in at least one large corporation.

Where are we heading? I think that we're moving toward the idea of a "dedicated learning center" in each of our field sites. This center would provide us with the kind of flexibility in terms of media that will be essential to our ability to meet the diverse learning needs of our employees. More specifically we will be able to offer instruction through the medium or combination of media that both supports the learning objectives we've set for a given course or program, and affords the employee much greater control over the learning process. Control over the learning process not only makes sense from the standpoint of pedagogy, but also from the standpoint of the business. Employees will be better able to accommodate what are often competing demands made of their time--that is, working and learning. And ideally, we will get to a place where this accommodation of competing demands will give way to integration of complementary demands.

At the present time, we're trying to resolve the matter of how this learning ought to be configured, and which resources should be accessible from the individual employee's work station, and which should be located in some common area within the office.

I think that the evaluation process will also become more decentralized, and focus on the provision of learner feedback. PC-based technologies, for example, provide numerous opportunities to imbed these feedback systems within the instruction itself.

We're presently experimenting with these capabilities in a number of different formats, including computer based education, computer managed instruction, interactive video, and the so-called intelligent tutor systems. We're also in the process of converting the examinations associated with our data processing certificate program to a PC format. This will help make this traditional credentialling activity virtually self-paced.

In cases where the delivery media may not lend itself to in-process feedback, we will see that the particular course is made part of a larger learning event by creating more structured pre and post course activities.

I also suspect that our evaluation staff will become even more active in the up-front planning and development of our distance education programs. For example, they will take a more direct responsibility for integrating the results of our own experience with distance teaching and learning, as well as the kind of evaluation research that many of you are currently involved with, into the design of our education and training activities. Put another way, we'd like to be in a position where we can invest a greater amount of energy in formative and process evaluation than in summative evaluation.

But regardless of the particular role that evaluation will play in the future, I can state with some amount of certainty that it will be a critical one. Because evaluation will help give us the sense of confidence that comes with knowing that our distance education is being "done well," and more importantly, the sense of satisfaction that comes with knowing that it's being done "as well as possible."

Keynote Address

# Examining Future Telecommunications Technologies

Larry Dickerson

Keynote Address to Third Annual Conference on Teaching at a Distance:

**Evaluation of Teaching/Learning at a Distance**

Inn on the Park — Madison, Wisconsin

August 3, 1987

Back in the mid 1960's Marshall McLuhan coined the phrase "The Medium is the Message." One of the key concepts surrounding this idea is that it is impossible to separate the meaning of information from the medium you are using to disseminate that information. It seems very appropriate, therefore, in a conference whose purpose has been described as focusing "...on the evaluation of learning via distance education technology," that we should spend some time looking at the technologies themselves.

For those of you who have been involved in the processes of distance education for some time, I'm sure it comes as no big surprise to you to be told that telecommunications technologies are in a constant state of change, and that each of these changes can have significant implications for the work we all do. These technologies are enabling educators to improve the quality of the learning experience for their students; to access support materials faster and more efficiently; to serve new students in new ways and in new locations; and to reduce many of the previously time consuming burdens of the teaching process, such as information transfer and administrative controls.

At the same time, these technologies are creating a whole new set of problems for the educator. They are expensive. They are complicated. It is often very time consuming to learn how to use them effectively. And, because the growth and development of these technologies is often driven by their applicability to other interests in our society – especially the interests of entertainment and commerce – there are a wide variety of concerns (often totally unrelated to the field of education) which must be taken into consideration before these tools can be used effectively within an educational environment.

My purpose this evening, therefore, will be to take a very cursory look at a broad cross section of these technologies and to talk about some of the things you may wish to think about as you consider using them in your work.

By way of illustration, I will also be describing the way we are using some of these technologies here in Wisconsin. But let me begin by placing this evaluation in context.

In 1980 Alvin Toffler wrote a book called "The Third Wave." In it he talked about the fact that he saw our economy moving away from an industrial base and toward one centered on information. Although this was both an interesting and controversial concept back when it was first presented, most of us now accept Toffler's prediction as a matter of fact. We are told that our Gross National Product is approaching $3 trillion dollars, and almost half of all economic activity in this country is the result of the collection, organization, analysis, and dissemination of information and information related services.

Obviously this fact has tremendous implications for those of us in the business of education – for the collection, organization and analysis of information has been a fundamental part of what educational institutions have been doing for hundreds of years. In an Age of Information, educational institutions should be in a tremendous position of strength.

But the interesting fact is that many of the experts in this field don't agree with this assessment. They point out that traditional educational institutions have been among the most resistant to such changes. As a result, the role and responsibilities of educational institutions are being subsumed by other institutions, such as business and industry and private entrepreneurs. Unquestionably there are many in the field of traditional education who challenge the validity of some of these private efforts from a pedagogical perspective, but there can be no doubt non-public educational institutions are responding to a very strongly felt need in our society.

According to recent estimates from the Bureau of Labor Statistics, during the next decade 60% of all new jobs will occur in three categories: professional and technical, clerical and service.

More importantly, the majority of those in today's workforce will no longer hold only one job for the remainder of their working careers. The average worker will change jobs every 3-5 years.

These new jobs will demand workers who are both adaptable and flexible. The most valuable employees will not be those who have a large store of information committed to memory, but those who have the capability of identifying what they need to know, often in very confusing circumstances, and then quickly teach themselves what needs to be learned.

Unfortunately, these are not the kinds of skills one learns in institutions where the majority of one's time is spent sitting in a classroom supervised by teachers whose main means of imparting information is through lectures. In fact, it has been suggested that one of the most revealing ways to determine how effective an educational institution is in preparing one for tomorrow's job market is to examine how that institution uses its people. The claim is that an organization's effectiveness is inversely proportional to the amount of time it relies on a person, rather than on technology, for the purpose of disseminating information. The significance of this claim is underscored by recent studies which have shown that the traditional classroom teacher now spends approximately 85% of his or her time doing nothing more than disseminating information.

I suspect there are many of you who would want to take issue with this analysis. Nevertheless, you would probably all agree that if we can find additional ways to allow our teachers to concentrate on the process of teaching, rather than on the process of simply transferring information, there would be tremendous benefits for all concerned. The good news is that as we look at the future of telecommunications technologies, this is precisely what is possible.

There are two factors that appear to be having the greatest impact on the field of telecommunications technologies today:

(1) Improvements in the technologies themselves; and

(2) Deregulation of these technologies.

These two factors have both positive and negative implications for the use of these technologies in the field of education. Let me illustrate by citing a couple of specific examples.

**Broadcasting**

When anyone mentions telecommunications technologies, one of the first systems which comes to many people's minds is that of broadcasting.

In Wisconsin there is an especially good reason for this fact, since our use of these technologies dates back to the very beginning of broadcasting itself. In 1916 the University of Wisconsin received a license for the first radio station in the country, 9XM. At first the station was only able to broadcast weather and market information in Morse code. But the following year the station added voice and music to its broadcast, and in 1922 it's call letters were changed to WHA.

In 1954 the University also received the first non-commercial television license in the state, and today the entire state is blanketed by both public radio and television programming.

Both of these systems are still used today to offer both formal and informal educational programming to residents around the state. Our statewide television system, for example, provides over 2000 hours of programming each year for K-12 students, and over 400 hours of credit programming for at home viewing from our post-secondary institutions.

Improvements in the technology of broadcasting have had a tremendous impact on this medium over the years. I'm sure there are many in this room who can still remember back to the early days when we used to train a locked down black and white camera on a teacher in front of a blackboard and called it "educational television." Today's full color, documentary style, computer enhanced programs have come a long way from those early pioneering efforts!

Within the next few years we can expect to see many more improvements in broadcasting technology, including such things as digital video (which will allow us to display pictures within pictures,) stereo sound, second audio channels for additional languages or for follow up information that can be downloaded to the student's computer, a variety of teletext services, universal remote controls, and a wide range of new display technologies.

But all these bells and whistles don't come cheaply. In fact, this is one of the biggest criticisms that educational institutions have about this medium. It costs too much. The average cost of a high quality broadcast television program is now over $1,000 a minute – and often a great deal more. The only way we can afford such costs is to develop a consortium of users, secure funding from outside sources, and then have a darn good marketing plan! The result is that the use of broadcast television for instructional purposes is now being driven by many other factors than the simple dissemination of information.

**VCR's**

Another criticism leveled at broadcast television is that it is very inflexible. It is often driven more by the clock than by the needs of the institutions using its programs. Fortunately technology has also begun to help solve this problem as well with the advent of the video tape recorder. As the prices of these recorders have continued to drop, the users of broadcast television have been able to reassert their control of the medium by taping programs for use at their convenience rather than the whim of the station's program manager.

In fact, some educational institutions are now deliberately having their programs broadcast after normal sign off times (such as between midnight and 6AM) with the expectation that students will set their VCR's to automatically record these offerings at time of feed. Since only those students who enroll for these classes know when the programs will be fed, the educational institutions can also maintain some control over who has access to them.

**Sideband Technologies**

In addition to improvements in the technology of broadcasting, deregulation of this medium is also opening up some very interesting possibilities for the innovative educator. The two areas which have received the most attention within the past couple of years are those related to the use of radio's Subsidiary Communications Authorization (SCA) and television's Vertical Blanking Intervals (VBI's).

**SCA**

A few years ago the Federal Communications Commission made it possible for the licensees of educational radio and television stations to lease time on these sidebands for commercial use. The primary purpose for this ruling was to help the station licensee's overcome some of their funding problems. But in the process they also encouraged the broadcasters to explore some new ways to use these capabilities.

In Wisconsin, for example, the agency for which I work, the Educational Communications Board, took advantage of these developments and moved its instructional radio programming off of the main radio carrier and on to the SCA. Not only did this free up time for general audience programming on our primary FM service, it also allowed us to monitor the use of our instructional programming more effectively.

Since you need a special receiver to hear programming on the SCA, which the schools must acquire through the agency providing these programs, we now know precisely who is listening and can therefore work closer with these individuals and agencies. Currently the ECB offers over 500 hours of instructional radio programming a year over it's SCA. Most of the remaining time is used to provide a reading service for the visually impaired.

Using today's technology it is possible to offer at least two distinct SCA services. However, new technologies will make it possible to offer many more. In fact, one vendor of SCA equipment recently announced they will be releasing some equipment within the next year that will make it possible to divide the existing SCA spectrum into 30 separate channels. In addition to being able to provide audio programs on these channels, educational agencies can also use them for a wide variety of data services such as downloading to computers, one way electronic mail, etc.

**VBI**

A similar service is available on our statewide television network using the Vertical Blanking Intervals, or VBI's. Most of you have probably seen the VBI's, even though you may not have known it. They are contained in that dark black line that rolls through the picture when your television is out of adjustment. There are 21 lines in the VBI that were originally set aside by the FCC for engineering purposes. But again, with recent advancements in technology, the FCC has allowed broadcasters to use these lines for other purposes as well. In Wisconsin we are using some of these lines to provide an information service for the hearing impaired, as well as agricultural news for the farmers in the rural areas of our state. But there are several other lines available just waiting to be used by some forward thinking educators – or for leasing to commercial entrepreneurs!

New uses of the SCA and VBI are limited only by one's imagination. The important concept to remember is that if you have access to either FM radio or television broadcasting facilities, either as a licensee or through institutional agreements, you may also have access to several additional communications channels which can be used for a wide variety of services.

**Telephone Technologies**

We hear a lot of talk in educational circles today about the need for two-way interactive telecommunications systems. And yet we often overlook the most obvious, and usually the most inexpensive, two-way medium that is in every school and every home – the plain old telephone.

Practically every day we are seeing new innovations in telephone technology. There are briefcase phones, car phones, plane phones, boat phones, and even a new pocket phone that weighs less than 15 ounces. One of the most recent innovations is a phone you can dial by just speaking the name of the person you wish to call, following which your telephone will do all the dialing for you! And remember those videophones that were introduced at the World's Fair over 20 years ago? Well, they're coming back. The difference is that they are now much more sophisticated, and capable of transmitting a much greater variety of pictures than just the mug of the person you are talking to on the other end of the line.

**ETN**

The telephone can be used for one-on-one personal conversations, to phone in questions or comments during a live broadcast, or hooked into a network to create a teleconference. Here in Wisconsin we are very fortunate to have one of the more sophisticated teleconferencing systems in the country, the UW-Extension Educational Telephone Network. It was established in 1965 and currently interconnects close to 200 sites around the state.

Each year over 35,000 people participate in courses and lectures on this system. They are currently reconfiguring this system and adding a state-of-the-art digital bridging system which will make the ETN better than ever.

**Audio Text**

Another use of the telephone that is becoming increasingly popular is called Audio Text. The principle behind this system is very similar to the concept which led to the telephone answering machine, only a little more sophisticated. The main difference is that Audio Text messages are digitized voice messages stored on a computer. When the user calls such a computer, he or she has the capability of receiving literally hundreds of different messages simply by tapping in a different set of numbers on his or her touch tone phone.

Such a system was recently successfully demonstrated by the UW Telecommunications Lab for our extension horticulture agents. The agents simply recorded their responses to the hundreds of different questions they receive each year about gardening and pest control. These were then digitized and stored on a computer that is programmed to automatically answer a telephone.

Obviously such a system is much more convenient for the general public. It uses a technology with which they are all familiar, and they now have access to the information they need at any time of the day or night, 7 days a week. More importantly, it frees up the extension agents so they can spend time on projects that require much more personalized attention than simply responding to redundant telephone calls. The implications of such a system for many other educational agencies are almost limitless.

**Computer Communications**

Computer communications is probably one of the fast growing technologies in the world of telecommunications, and we could probably spend the entire evening talking about this one topic alone. In addition to the systems I've just mentioned, there are literally thousands of on-line computer databases that are now available to anyone who has a computer and a modem, and new ones are coming on line every day. Such systems have probably done more to change our thinking about the availability and dissemination of information than any other telecommunications technology.

Computer conferencing has also opened up a whole new world of possibilities to educators. Using such systems it is now possible to teach courses to students all over the world, on any subject, at any time, and even in multiple languages – and no one ever has to travel further than the closest telephone.

This is not just a pie-in-the-sky pipe dream. It is happening today. In fact, just this past year I personally took a graduate level course in Ethics from the New School for Social Research in New York City without ever leaving my den in Sun Prairie, Wisconsin. Using my computer, and accessing a conference by calling a local telephone number, I "spoke" every evening to my classmates and instructor in New York, California, Iowa, Canada, England and Japan. If there was ever any doubt in my mind that we now live in a "global village," this experience has erased that thought forever.

**CATV**

Community Antenna Television, or what most of us refer to as Cable, is another technology that has been around for several years and with which most of you are probably familiar. It too is changing as a result of both technological improvements and deregulation. Unfortunately, from the educators perspective, many of these changes have not been in our best interest.

As you will recall, when cable systems first began to appear around the country there were a lot of blue sky promises about "hundreds" of two-way channels, with more program choices than any of us would ever want or need. Well, it hasn't turned out quite the way it was originally described. In all too many cases once a franchise had been secured, and a company had a virtual monopoly on cable in a community, it wasn't long before they began to renege on many of their pre-franchise promises.

More importantly, within the past couple of years, cable companies have been deregulated which has resulted in further loses, especially to educational institutions who were promised dedicated channels and times on these systems. Part of the reason for this, quite frankly, is because in many instances, the educational agencies have not used these channels very effectively. But in other cases, even though such channels have been well used, schools are now being told that their access time is going to be dramatically reduced. There are simply too many other services vying for space on available channels who are willing to pay the cable operator for delivering audiences to their products and services.

This raises a very important point about all telecommunications media, especially those that depend on the use of the airwaves or have exclusive franchises such as cable. "Electronic real estate" is becoming increasingly valuable. Unless you own, or have the license for that real estate, you can expect to be at the mercy of those who do. Think carefully about this when you start investing in systems whose access costs are not controlled by you, or at least by another public institution.

**ITFS**

If you have need for this kind of a system, however, there is another possibility you should consider – but soon! It is called Instructional Television Fixed Service, or ITFS. This is a group of frequencies that

was set aside by the FCC back in the early sixties specifically for use by educational institutions. There are actually seven sets of four channels each, designated by the letters A-G. These are microwave frequencies which means you need special equipment to receive these signals. You also have to be within line of sight and not more than 20-30 miles from the transmitter. This is usually sufficient, however, to interconnect all of the public institutions and/or major businesses within most local communities.

Although these frequencies have been around since the sixties, they haven't been well utilized by educational institutions, primarily because of the cost of capitalizing these systems. Consequently, several commercial companies went to the FCC and asked it to reallocate these frequencies for commercial use. Their plan was to use these channels for what has come to be known as "over the air cable systems." The technical term is Multichannel Multipoint Distribution Systems, or MMDS. Stated very simplistically, these systems select the best services that cable has to offer and feed them into homes over the air rather than paying for the rights of way and the up-front equipment costs of stringing cable.

The FCC agreed with many of the arguments of these commercial companies and did reallocate two of the seven groups. But at the same time they also made it possible for educational institutions with these channels to sub-lease the excess capacity on their channels to commercial companies. The hope was that this would get some capital following into these institutions which they could use to build such systems for educational purposes.

Currently there are over 600 such systems operating around the country, many of which are leasing their excess capacity. In Wisconsin our agency entered into a contract with Wisconsin Bell in which they will be constructing ITFS systems in 13 communities around the state in exchange for the right to use our excess capacity. This contract provides nearly $3 million dollars worth of equipment for use by educational institutions around the state.

Probably the most successful ITFS system in the country is located in the State of South Carolina. They currently have a system which blankets every inch of the state with four ITFS channels. These channels are operating 24 hours a day, and they still don't have enough capacity for all of their programming. They have just asked their legislature for funding to construct 4 additional channels.

The important thing to remember about ITFS is that the spectrum space that it uses is currently reserved specifically for educational agencies. But we have already seen that the FCC will not hesitate to reallocate these channels if they are not used by the educational community. I suspect we have only seen the tip of the iceberg concerning ways in which commercial entrepreneurs will want to use such frequencies. For example, there has been a great deal of discussion within the past several months about how such frequencies might be an ideal way to start up High Definition Television systems around the country.

We are also seeing a flurry of activity on the part of national educational organizations who have concluded that the boundaries of their campuses are limited only by the boundaries of a satellite footprint. And once they beam a satellite signal into a state, ITFS is an ideal system for moving their programs that "last mile."

**Interconnection Systems**

As I mentioned earlier, ITFS is on a microwave frequency which is licensed by the Federal Communications Commission. It is, in essence, an "electronic highway." There are many such highways available today, but they are limited, and they are being tied up rapidly by those who have a vision of how valuable these corridors will be in the future. Just as land and real estate was the "Coin of the Realm" in the Industrial Age, information and these electronic highways will be the basis of power in tomorrow's society.

**Fiber Optics**

The "glitziest" of these new electronic highways is called fiber optics. I'm sure most of you have seen the ads on television about the new fiber optic telephone services that are supposed to be so much better than the old analog systems that your mother can sing into her phone in New York and break your best crystal in California.

These ads, along with the hype of the fiber optic companies who continually barrage us with statistics about the number of voice channels they can pass through a thread of glass the size of a human hair, have, if you will pardon the pun, "glazed" over the eyes of many educators around the country. Administrators and school boards are breathing hard and ready to interconnect every school in their districts with the latest in fiber optic technology. Unfortunately, in all too many cases, they are discovering that such systems may not be quite the "magic bullet" that all of the promotional literature has promised.

This is not to suggest that fiber optic technology does not have a great potential, nor that you should not keep abreast of its development The important thing to remember, however, is that the little piece of glass fiber that everyone is raving about is nothing more than the transmission medium – just as the atmosphere is the transmission medium of microwave. The part of the system that makes the real difference, however, is the electronics on either end of that transmission medium. This is also the part of the system that costs a **lot** of money, and unfortunately, it's not always real clear who picks up these costs.

For example, in one case I heard about recently, a school system was about to sign a contract to have a fiber optic system installed, when someone had the foresight to ask if there were any additional costs the school system would be expected to absorb. They were then informed that they would, of course, be expected to provide the "codecs" at each end of the fiber. "Well, how much does a codec cost?" "Oh, only about

$60,000 apiece!" The point is, make sure you know "the rest of the story" before you get too dazzled by the digits.

**Satellite**

The other interconnection system you will be hearing a lot about within the next several years is satellite technology. As many of you know, public broadcasting was the first broadcasting network in the country to interconnect all of its stations using satellite technology. In fact, it is already time to begin thinking about replacing this system. A task force has been developed to look at our options for replacing it in the early 1990's.

I mention this only because, as plans are being made to replace this system, we should all be thinking about ways to incorporate the needs of other public institutions on it, rather than just confining it to the needs of public broadcasters. One of the reasons that more publicly funded institutions have not used satellites in the past is because the cost of the transponder time on these satellites. Transponders are like the "channels" on a satellite. Since each satellite only has a limited number of transponders, they determine the amount of capacity that is available for use. Currently transponder costs are driven by "Whatever the market will bear!" Again, if you don't own the highway, you are going to be at the mercy of that little man in the toll booth!

Currently most of the signals coming off of satellites are in a frequency known as the C band. Within the next few years, however, you will be seeing an increasing number of services offered on the Ku band. The Ku band is used on higher powered satellite systems which can be received on much smaller, and therefore much less expensive, dishes. It is also subject to far less terrestrial interference than the C Band.

One of the disadvantages of Ku band, however, is that the cost of transponder time is just about double the cost of C band time. The last time I saw a price quote for transponders, for example, a full-time, dedicated C band transponder was leasing for about $1 million a year, and a Ku band transponder for just over $2 million a year.

Within the next couple of years you will also be hearing about yet another group of services that will be available on the Ka band. One project currently on the drawing boards is particularly exciting. It is sponsored by NASA and is called the Advanced Communications Technology Satellite (ACTS). This technology will make it possible to obtain even greater benefits from individual satellites because they will be able to multiplex several signals on each transponder and send them back to earth as "spot beams" rather than the broad footprint that we usually associate with satellite signals.

There are literally dozens of different educational satellite services available today, with new ones being created just about every week for every imaginable special interest group. In fact, one of the biggest problems that many educational agencies are experiencing today is trying to keep on top of what's available and how to access it. Many school systems and public institutions originally invested in satellite dishes in the hopes of being able to capitalize on this plethora of services. But it wasn't long before they discovered that it is a full time job just trying to keep track of the different satellites, the different frequency bands, and the different encoding and decoding schemes that are now being used.

The experiences of these institutions are not unique. The growth and proliferation of telecommunications technologies is something that can easily overwhelm all of us. I'm often reminded of the response of Alice in Wonderland when the caterpiller asked her: "And who are you?" To which Alice responded, ""I - I hardly know, sir, just at present – at least I know who I was when I got up this morning, but I think I must have been changed several times since then."

What we do know, however, is that the telecommunications technologies about which we have been speaking this evening will continue to play an extremely important role in our society. More importantly, however, it is my personal hope -- as well as my challenge to you -- that these technologies will not become the private property of the entertainment and commercial interests in this country. But rather, that their design, their power, and their future will be driven by much higher standards -- standards which only the <u>educational</u> institutions in this country can set, and ultimately achieve.

# Keynote Address

## Critical Questions In The Evaluation Of Distance Education

Peter J. Dirr
The Annenberg/CPB Project
August 4, 1987

### INTRODUCTION

Thank you for the opportunity to share with you some ideas about important issues that must be addressed in evaluating distance education. I suspect that the distance education programs at many institutions in this country fail to address these questions, either when those programs are first established or during periodic assessments of the programs. My hope is that you will be able to lead others to reflect on the appropriate questions and to take appropriate actions.

I plan to lead you on an exploration of questions that I have clustered into seven broad areas. Those areas are: (1) Target Populations, (2) Pedagogical Design, (3) Quality, (4) Use, (5) Effectiveness, (6) Methodologies, (7) Leadership. I will assume that the distance education we are talking about uses telecommunications technologies--broadly defined to include audio, video, and computer-based technologies--in addition to the more traditional approaches of correspondence education to deliver all or part of the learning opportunities. And many of my reparks will reflect our experiences with evaluating telecourses. We are just now beginning to build experience in evaluating applications of computers and other technologies. Finally, I will take the liberty of using the term "evaluation" broadly, to include some activities that in other taxonomies might be called "research." One message that I hope emerges during our journey is that proper attention to these complex issues will require a variety of research approaches and might ultimately benefit from a pooled effort of some sort.

### (1) Target Populations

If we are to be successful, we must know and understand those whom we hope to serve. Who are the learners? What are their backgrounds and skills? What do they hope to get out of our courses? How much time will they have to devote to the courses? How well have similar groups of learners performed in your program or course?

These are all essential questions that have to be asked about our ultimate target population, the distant learners who take our courses. They can be answered in a variety of ways. For instance, the Annenberg/CPB Project funds studies that conduct focus groups with learners each year, especially through the evaluation of pilot lessons from our

courses. Furthermore, through periodic studies, we gather demographic data on students in our courses. As an extension of those efforts, we have funded Ron Brey, from Austin Community College, on behalf of the Instructional Telecommunications Consortium of the American Association of Community and Junior Colleges, to gather information annually on students who take telecourses at hundreds of colleges in the United States. He will build a longitudinal database through which trends can be traced over time.

I am sure many of you collect similar data, and I know that many of you are participating in the Brey study.

But let me suggest to you that there are at least two other target populations about whom you should be constantly learning. They are a group we call "gatekeepers" and another we call either "informal learners" or "general viewers." We are constantly reminded that distant learners will not have access to our programs unless the gatekeepers (such as faculty, administrators, and public broadcasters) think highly enough of them to make them available. So, we always involve gatekeepers in reviewing proposals, courses in development, and completed courses. It is important to know from them what they think the greatest needs are and what they think the strengths and weaknesses are of each of our offerings.

The other group, informal learners, is very important to us at the Annenberg/CPB Project, maybe more so than to you. Our mission is to make available high-quality higher education opportunities to all who want them, regardless of whether they want college credit for them. So, we constantly involve general viewers in formative evaluation of the television components of our courses. Then we track the numbers and characteristics of those who view the programs when they are broadcast. If you have similar needs, I will go into more detail during the Question and Answer period.

One way to categorize the distinction I am trying to make among these groups might be to use terminology sometimes used in business. Our <u>"clients"</u> are the formal and informal learners, those for whom we design our product. Our <u>"customers"</u> are the gatekeepers, those to whom we must first sell the product before it reaches the client. It is important for us to know and understand both groups in order to be successful.

(2) Pedagogical Design

A major question has got to be, "What are the 'design' implications of using telecommunications technologies to deliver distance learning opportunities?"

The first impulse in using the technologies to provide distance learning opportunites is to mimic existing instructional patterns. For instance, early television courses used the approach of a camera in a real classroom or a classroom simulated in a television studio. The idea was that the faculty member would deliver the same lecture via television that he/she would in the classroom. (I call this "peeping Tom television.") In other words, the television medium was used to extend the reach of the classroom. That did not require major modification of the ways in which courses were taught. The instructional design remained constant.

There are still legitimate reasons for using this approach to deliver educational opportunities. But it was not long before some began to ask, "Can television help improve educational opportunities rather than just extend them?" Thus, you began to see the use of television to reach into places that most classes never had the opportunity to see, or to bring into the classroom persons or resources that were formerly available at only a few of the most fortunate or prestigious institutions, or to slow down physical, chemical, or biological processes so the learner could see things the human eye is normally incapable of seeing, and so forth.

Likewise, the first computer-based courses consisted of transcriptions of faculty notes. But it was not long before some developers began to take advantage of the branching and recordkeeping capabilities of the computer to offer quite different learning experiences to students.

The point I am making is that the very capabilities, limitations, and characteristics of the technologies we use should lead us to examine very carefully the pedagogical assumptions we make about learning and teaching. That, in turn, might have a definite effect on the design or pedagogical approach used for the course or lesson. We are beginning to see evidence that the availability of the technologies is beginning to alter the way faculty perceive and conceive the courses they teach. So far, this has been especially true in writing and the sciences. We believe it is beginning to happen in foreign language courses. It is not clear at this time how these changes might affect the distant learner.

(3) Quality

There are two questions about quality that I think have primary importance for us as educators and researchers. The first is, "How can we maintain quality control over our distance education course offerings as we are developing them?" The second is, "How can we measure the quality of the offerings we are providing?"

Quality control should be foremost in our minds. Unfortunately, I do not know of any one approach that can guarantee high quality offerings in all circumstances. Let me tell you some of the things we do at the Annenberg/CPB Project to try to assure high quality resources. (I should point out that we have not dealt with the related issue of what colleges do with the resources we develop and how the quality of the students' experiences in the course vary as a result.)

First, we have, as I am sure some of you know only too painfully, a very thorough proposal review process. By the time we commit to a course, the proposal has been reviewed by more than 25 people, including some of the most respected academics and administrators in the country. We ask them to look at specific aspects of the proposal, including the content, the pedagogical approach, the production approach, the budget, the quality and experience of the people involved, the appropriateness of the proposed activities for distant learners, the likelihood of use by colleges and universities, and so forth. In research terms, we submit the proposals to a panel of independent judges who are peers of the applicants. And we have found over the years that this is an extremely effective way to learn about the strengths and weaknesses of a proposed course.

Second, we require each project to have an external Advisory Committee and we specify what we expect those advisors to do. This includes:

- o bring a broad view of the subject to the project;
- o insure that content coverage is accurate, thorough, and properly balanced;
- o speak to the needs and interests of many different constitutencies;
- o promote and encourage use of the completed project;
- o react to and approve each element in the project such as curriculum outlines, scripts, and rough cuts.

Furthermore, one of our staff members attends the meetings of the Advisory Committee.

We have found this Advisory Committee process to be an effective means of quality control. And, I am happy to report to you, so have the course creators, even those who were skeptical at first.

We have also instituted one procedure that addresses both the questions of (a) maintaining and (b) measuring quality control. We require that each project submit at least one entire lesson (at the pilot production stage) to evaluation by an independent evaluator. This includes use of that lesson by faculty and students at several sites

around the country. This also has been extremely helpful and informative. It has identified for the course creators the strengths and weaknesses of the pedagogical and production approaches taken, has uncovered issues that need to be addressed, and has normally recommended ways to correct deficiencies and strengthen the course. Here again, even the skeptics have found this process to be helpful.

For your further reference, I have attached copies of our guidelines for advisory committees and guidelines for formative evaluation that are based on a report on formative evaluation prepared for the Project by Valerie Crane of Research Communications Incorporated.

One of the best ways to measure the quality of our distance education programs is to look at their use.

(4) Use

At some point, we are all held accountable for the programs we develop or manage. And the bottom line of that accountability often is some counting of the extent to which our offerings are used. But the questions of use are more complex than that. I have already addressed the importance of knowing the learners who will use our distance education programs and courses and the gatekeepers who often control access to those programs. This knowledge is important for accountability purposes but it should also be helpful in deciding on pedagogical design and in promoting broader use of your programs and courses.

I am sure most of you regularly gather some demographic information about your distant learners. For one thing, you know how many there are. Do you also know basic demographic characteristics such as age, gender, family and work responsibilities, previous education, learning interests, learning skills, etc? Do you probe deeper and study learning styles, learner interests, faculty reactions, etc.?

And, do you distinguish among various types of users? For instance, we put a value not only on tracking "formal learners" who use our courses (that is, those who enroll in the courses for credit), but also "informal learners" who find intellectual stimulation and challenge in the more public part of the courses (especially the television programs). Here are some of the types of information we gather on a regular basis: (a) about the formal students--standard demographic data such as age, gender, academic status, previous education, how they learned about the course, how they believe the course compares to other courses they have taken, how much effort they put into the course, how well they believe they will do in the course; (b) about the faculty--how they learned about the course materials, how they believe those materials compare to other

materials available to them, whether they have used materials in other courses they have taught, how their students in this distance course compare to students in other courses they teach or have taught, who is involved in making course adoption decisions, using what criteria; (c) about informal learners--how they learned about the television series, how they valued the series, age, gender, socioeconomic status, etc. For television courses, we also track how many station managers think highly enough of the courses to place them in their broadcast schedules and how many households fall within the range of those stations. That tells us the potential exposure of our courses. Needless to say, gathering these data requires a great deal of effort and uses a variety of approaches. I will be happy to discuss this in more detail during the Question and Answer period.

We track some of those data every semester for every one of our television courses, and that enables us to track trends over time. This includes information on station carriage, household penetration, viewership, college adoptions, and course enrollments.

Beyond these types of demographic data and other information about the users of the course materials, isn't it helpful to know something about how the course components are used? You spend a lot of money and effort to create and distribute the various course components, such as the television programs, textbook, study guide, class meetings, faculty phone hours, and faculty manual. How valuable are those components to the learners? Are there some ways the components might be improved? Are there some that might be dropped?

We periodically look at those questions. In one recent study conducted by our staff, we found that many faculty did not receive the faculty manuals for our courses and many of those who did receive them used only one section of the manual, the pool of test items. As a result of that study, we have modified the content and structure of the faculty manual for FRENCH IN ACTION, and will probably make even further modifications of manuals for other future courses. In another study, we found that students prefer to view the television component of a course one hour at a time rather than at two separate half hours. This information has proved helpful to PBS and the stations as they make scheduling decisions.

[I must diverge here to mention something that does not involve distance education at all yet is a spin-off of our services to distant learners. One of the greatest challenges that we face at the Annenberg/CPB Project in measuring use of our resources is developing some way of estimating the extent to which they are used to supplement

existing courses. It is easy to capture data on students who enroll in telecourses because they are "reportable." However, when a college buys our course materials for supplementary use (and we hope that many will, now that we have lowered the price of our new courses to $350 for a full semester's worth of video programming and $29.95 for our audio courses) they are not required to report uses to us. We know, for instance, because faculty members report this to us, that some of our programs from THE BRAIN have been used in courses in many disciplines on a single campus. To date, we have relied on anecdotes to know this. During the coming year, we will be addressing the question of how to gather information on such uses systematically in order to be able to estimate the extent of such uses nationwide.]

(5) Effectiveness

"Prove to me that telecourses teach!!!" How often have you been issued this challenge by a cautious administrator, a wary board member, or a skeptical faculty member? Unfortunately, it is a challenge without a solution. First, there is no such thing as a "telecourse" disembodied from a faculty member. Second, the challenge implies a response of "Compared to what?" And the answer to that question is invariably, "Compared to a similar on-campus course." For reasons I will describe in the next section, that is not feasible to do. And third, I wonder why telecourses (and other courses that use telecommunications for delivery) should be held to a higher standard than all other college courses! In a few minutes, I will suggest one way to turn this challenge around and to view it as an opportunity to exert leadership in evaluation.

In the meantime, however, we make the best out of a difficult situation and create inventive approaches to addressing the question of the effectiveness of distance education courses. One indicator of effectiveness is the number of institutions that adopt the courses. This is, in effect, judgment by our peers. A second indicator is the number of students who take the courses and their reactions to the courses; in other words, judgment by our primary target audience. And a third indicator is the vast numbers of informal learners who take advantage of the availability of the course resources to pursue some learning on their own.

There are other measures of effectiveness that still elude us today. We suspect that many of our courses have impacts that we are not understanding because we have not developed research protocols and instruments to measure them. These are sometimes referred to as "elusive effects." For instance, do students who have taken CONGRESS: WE THE PEOPLE for credit have a better understanding of Congress because they have been able to see that body in action? Are

they more likely to want to travel to Washington to see Congress in action? Will they be more prone to follow politics in the press or to pursue careers related to politics?

Another example is FRENCH IN ACTION. Will students who take that course be more inclined to use the language than those who learn it in traditional classrooms? Will they be more sensitive to subtle cultural aspects of the language because they have seen those aspects applied in natural settings?

Unfortunately, we are not able to answer those questions today because we have not figured out how to measure those aspects of the courses. They cannot be measured by the paper-and-pencil tests used by most colleges, and certainly not by the multiple-choice exams used in a majority of courses. Measuring those aspects of effectiveness remains a major challenge for the future.

(6) Methodologies

So, how are we to measure the effectiveness of our courses and the impact we have on a student's education? I wish I could tell you I had an answer to that question. But I do not. Instead, I will share with you an outline of a story and urge you to attend Rich Shavelson's presentation tomorrow. He was the principal investigator of the study I will describe and he will focus on it in detail.

We had hoped to identify a traditional research methodology (i.e., an experimental design, using control groups) that would allow us periodically to compare the effectiveness of our courses to comparable on-campus courses. We hired Rich and a team of researchers at Rand Corporation to develop the methodology and apply it in a feasibility study.

At the risk of oversimplifying what was a complicated study, let me summarize the findings as follows:

- o it might be <u>possible</u> to develop such a methodology, but it is not <u>feasible</u>;
- o one major problem is that the students who take telecourses are de facto different from students who take traditional courses. Therefore, it is not possible to start with two groups of comparable students. The study would start out with a sample bias;
- o it is next to impossible to control the treatment. No two colleges teach the course exactly the same way, nor would two faculty members at the same college offer it the same way;
- o it might be possible to develop a quasi-experimental

design that would assess the effectiveness of a course over a two or three semester period, but the characteristics of the students would have to be kept approximately equal over the semesters and the faculty member would have to be constant over that period;

- o consider placing greater emphasis on the case study methodology, combining it with the quasi-experimental studies.

The authors of the report ended up saying, in effect, "There are over 300 studies spanning a thirty year period that conclude persuasively that telecourses are at least as effective as traditional courses. Why not accept the fact that learning that results from the telecourses is basically exchangeable with (not identical to) learning that results from traditional on-campus courses?"

My recommendation to you is that we all, as one community, accept the recommendation of the Rand group and focus our attention not on trying to prove that telecourses and other types of distant learning approaches teach, but rather what they do differently than traditional courses. In other words, what is the value added? One value is that for at least some students those programs serve (we know it ranges from 20% to 35% for telecourse students) there are no alternative options. What are other unique advantages of your distance education programs?

In pursuing that question, we should be free to draw on a variety of research methods used by the many disciplines we serve and should not feel constrained to use only traditional social research methodologies that require control and experimental groups. The case study and participant-observer methodologies might be more productive in some cases, if they are properly implemented.

(7) Leadership

Now I come to one of the greatest challenges before us, a challenge that is thrust on us by the high expectations placed on us.

I don't know if you have had the same experience I have had for the ten years that I have been at CPB. One of the questions most frequently asked of me has been, "How do we know that these courses teach?"

We can all agree that it is not fair to expect us to be held accountable to a standard that is not applied to other forms of instruction. (I am assuming that I am not the only one here who has worked at an institution where traditional courses are not held up to the same scrutiny that television courses are expected to withstand.)

Well, here is the challenge. Do you believe in the strength and value of your programs and courses? If so, why not say so to those who issue the challenge. Tell them you are willing to subject your programs and courses to any level of scrutiny, on two conditions: (1) that the evaluation be conducted by a disinterested third party who is skilled in evaluation, and (2) that their program or course or a comparable on-campus program or course be subjected to the same level of scrutiny conducted by the same third party.

I do not think you will find many faculty members or administrators taking up the challenge. But if they do, I have confidence that the evaluation would substantiate the findings of the 300 television studies that have gone before. Your program or course will be shown to be as effective or more effective than the on-campus course. The results of the two will be judged to be exchangeable.

I must admit that I believe the cards are stacked in such a study. When you consider the amount of preparation that goes into developing telecourses, the thoroughness of the review process, the richness of the resources assembled, and the breadth of the points of view brought to the course by the advisors and developers, it is difficult to imagine any on-campus course that could compare in quality. But I admit to the possibility that my perception might be somewhat biased.

What an opportunity! Imagine what could happen if people begin to accept your challenge. Your campuses could come alive with people who are asking, some for the first time, how well they are doing what they are paid to do and how they might do it better. What an opportunity!

CONCLUSION

Well, there you have it. We have wended our way through the minefield in which we work. We have asked questions about our target populations. We have seen how evaluation questions and the pedagogical design of distance education courses might be intertwined. We have touched briefly on the issue of quality, noted the importance of use, commented on the difficulty of documenting the effectiveness of our courses, and struggled with the question of the methodologies we use to measure effectiveness. Finally, we have suggested one way we all might exert some leadership in the area of evaluating educational offerings.

And having said all that, we have just scratched the surface. I have not pretended to provide you a full agenda for evaluating distance learning opportunities. I hope I have at least left you with the notion that this question is one of deep interest to us at the Annenberg/CPB Project.

If you still doubt the Project's interest in this field, let me point to two concrete examples of our interest. The first is the American Journal of Distance Education. We have provided funding to establish this journal because we believe it is important for you to have a forum for the discussion of issues such as those we have covered today and many others being addressed through the agenda of your conference. Second, the Project will be providing funding to help Michael Moore and The Pennsylvania State University hold an invitational symposium next summer at which time they hope to lead top evaluators and practitioners of distance education in developing a research agenda in distance education that will serve this country for the remainder of this century. We believe both of these efforts can contribute substantially to improving evaluation of distance education in this country and ultimately the quality of the distance education programs themselves.

Let me offer you one final thought. There are several evaluation needs and interests that many of us share. It makes little sense for us all to be reinventing the wheel independently. Why not use the good offices of the organizers of this conference to develop a list of the evaluation activities each of you plans to conduct in 1988. I believe such a list might prompt some of you to undertake joint efforts. If my office could assist in such a venture, we'd be glad to help.

I thank you for being so patient and attentive. In the remaining minutes, I would be happy to answer questions.

Annenberg/CPB Project

Guidelines for Formative Evaluation
of Materials Development Projects

## Why Conduct Formative Evaluations?

It is important to obtain indications early in the development of course materials:

- whether the materials (individually and together) are effective in teaching the target audience(s);
- whether they have sufficient appeal to gatekeepers such as college administrators, faculty, and television program managers to warrant carriage and adoption;
- whether they have sufficient appeal to students to warrant enrollment and persistence;
- whether the formats for the course components are appropriate and effective;
- whether the quality of the course could be improved by making changes in the production formats of the course components;
- whether the course development team members are working together effectively;

and similar issues.

Formative evaluation offers the course development team an opportunity to test ideas and approaches with representatives of the target audience(s) for the course. In the past, projects have found that this type of reality testing contributed substantially to decisions about further development of course materials.

In requiring each project to obtain an early assessment of the course materials, the Annenberg/CPB Project provides a great deal of latitude in research design. The purpose of these guidelines is to provide project personnel and potential applicants with ideas to consider in formulating formative evaluation plans for their projects.

## What Is Formative Evaluation?

Formative evaluation is the process of getting systematic feedback from the target audience(s) for the purpose of developing and improving the quality of course materials during the production process. Formative evaluation usually addresses specific issues such as the adequacy of a single unit or lesson, the pacing of the lesson, the effectiveness of a program's host or experts, and is distinguished from summative evaluation which is conducted on an entire course once it is completed. Specific issues on which formative evaluation might focus include the message design of video, audio, and print materials, the overall appeal of the lesson, the lesson's effectiveness in accomplishing its goals, etc.

Formative evaluation is normally an on-going process, conducted at strategic points in the development of a course, thereby permitting the project team to build a body of knowledge about the course materials and target audience(s) through testing and retesting of the course materials and concepts.

## What Should Be Tested?

The course development team and the evaluator should work closely to tailor the formative evaluation to meet the needs of the project. This involves understanding and clearly stating the goals and objectives of the course and the lessons that will be tested. Depending on the goals and objectives to be accomplished, the following are some of the things that might be tested:

- ability of the course materials to attract and hold the attention of formal and informal learners;
- appropriateness of the pedagogical design, production format, pacing, etc.;
- effectiveness of host, experts, and other talent;
- appeal of the materials to students, broadcasters, faculty, and administrators;
- the relative contributions of the various course components (e.g., television programs vs. the print components);
- learning outcomes, such as ability to recall, analyze and apply information;
- the importance (or lack of it) of sequence in the use of the course materials;
- effectiveness of course materials compared to materials used in comparable on-campus courses;

In short, any question that might help the course development team create a better course is an appropriate topic for formative evaluation.

Who Should Be Tested?

Subjects should be drawn from those populations who are the target audience(s) for the course materials and the "gatekeepers" or decision makers who decide whether the course and course materials will be made available. These normally include some or all of the following:

- adult learners
- distant learners
- informal learners/general audience
- faculty
- college administrators
- managers of programs for distant learners (including those who distribute those programs, such as public television station managers)

Study samples should be drawn from the the universe of users of the materials and should be representative of that universe and its several subgroups.

There are a number of considerations in selecting subjects for the evaluations:

- Select a broad range of students to reflect the broadest range of potential users of the materials. This should include students at 2 year and 4 year colleges, on-campus and off-campus adult learners, those of average ability as well as those at both extremes of the spectrum, those with prior experience with the relevant technology(ies) and those with none. The overall demographics of the group(s) should parallel the demographics of all learners likely to use the materials (see Crane, 1985 and Brey, 1985).

- Likewise, faculty members and college administrators in the sample should be representative of the wide range of diversity in higher education.

There is no magic number for determining the size of evaluation samples. Those evaluations that have been most effective in the past have involved between 100 and 200 students and 50 to 100 faculty and college administrators. Those subjects have usually been located at 6 to 8 sites across the country. And those numbers have usually permitted the cross-breaks and other data

analyses that have been conducted in the past. In some cases it was found necessary to pay a modest stipend of $10 to $25 to the evaluation subjects, especially when they were being asked to read significant amounts of print materials and listen to audio programs before attending a 2 hour evaluation session.

In yet other cases the evaluator experienced great difficulty in getting access to a potential pool of students. Some colleges interpret the Right to Privacy Act as prohibiting them from sharing the names of students for the purpose of recruiting subjects for studies such as formative evaluations. In those cases, the cost of recruiting subjects became more expensive and time-consuming than in other studies.

When Should The Testing Be Conducted?

As a project is designed, every attempt should be made to identify those points at which the course development team will need feedback on how the development is progressing or guidance on how to improve the effectiveness of the course materials. The Annenberg/CPB Project normally requires at least some form of formative evaluation after the pilot lesson has been completed.

The need for information will probably be different at various stages of the course development process. At the pre-production phase, it is cost-effective to test some basic concepts. For example, existing materials can be tested to determine how effectively different production techniques work with the target audience(s). This is also a time when treatment or script testing can show whether the approach to content is appropriate, whether the content is presented clearly, and what problems students encounter in absorbing the information in a given lesson. The selection, roles and effectiveness of host, experts, and other talent can also be tested at this time.

During the pilot development phase, rough cuts and fine cuts (as well as the pilot lesson itself) can be tested to analyze pacing, effectiveness of hosts and experts, use of graphics, level of difficulty of print and video/audio, and correspondence among all the lesson components. Findings from the pilot stage evaluation should inform decisions aobut developing the remaining lessons in the course. For this reason it is important to consider the lesson as an integral unit and to assess the effectiveness of the component parts as well as the whole.

Additional testing conducted at strategic points during full course development can show whether revisions made as a result of earlier evaluations were effective. This is also the time when market studies with college faculty and television program managers might be helpful in determining the kinds of activities that might best lead to course adoptions and enrollments.

## How Might Testing Be Conducted?

The formative evaluation for each course should be designed and implemented to best measure the effectiveness of the components of that course. Normally, the evaluation would be designed and implemented by a "third party," i.e., someone not directly connected with the course development team.

The procedures should simulate as closely as possible the conditions under which the course materials would be used by students. For instance, when print materials are tested, they should be reviewed by the students prior to the testing session, just as they would be expected to review the print materials in a telecourse before viewing the television lesson. Then they would view the video lesson in a group, answer questions and exam items about the lesson, and participate in a focused discussion about the lesson. Faculty might review the print materials and video lesson in group sessions just as they might review curriculum materials in departmental meetings.

## Acting on Evaluation Results

When the results of the formative evaluation become available, a written report would be submitted by the evaluator and a feedback and discussion session would normally be scheduled between the evaluator and the course develpment team or some portion thereof.

Results of the formative evaluation will either confirm the hypotheses or decisions of the course development team or will suggest where changes are needed. Findings of pre-production evaluation can be acted on during the pilot developmental phase.

Findings of the pilot evaluation can be acted on during the full course development. And findings of evaluations during the full course development phase can provide direction for implementation in marketing the course. In the past, project directors found formative evaluations were helpful in making production adjustments, developing materials, and informing the marketing and distribution efforts for their courses.

## Ideas On Selecting An Evaluator

Ideally, the evaluator should become involved in the project as early as possible, even during the proposal writing process. The ability of the evaluator to work closely with the course development team is critical to the success of evaluation. Early selection and involvement of an evaluator will foster a team effort, provide adequate time to consider a range of project needs that might be addressed by evaluation, and permit the timely scheduling of research studies.

In considering potential evaluators, ask for written proposals on how they would design an evaluation best suited to your project. If you get a few such proposals, you will have a basis for

comparing evaluation approaches as well as how well the evaluator is likely to work with members of the course development team.

For Further Information

These evaluation guidelines are based on the Project's experiences with its first television-based projects. A more detailed description of those experiences is contained in a paper by Dr. Valerie Crane entitled, "A Study of Formative Research Practices For The Annenberg/CPB Projects: The First Five Years." Copies of that paper are available from the Project on request.

In addition, your project officer and other project staff are available to discuss ideas and questions you might have about formative evaluation.

# Keynote Address

## EVALUATION OF BROADCASTING IN EDUCATION

Presentation Notes*

Dr. A. W. (Tony) Bates
Professor of Educational Media Research
Institute of Educational Technology
The Open University
Walton Hall
Milton Keynes
United Kingdom

Keynote Address
August 4, 1987

*Audio and video tapes of complete presentation are available. See Preface and order forms.

## Learner differences (adults)

**Matsui (1981) - TVOntario**

| *Not interested* | *Structured* | *Open* |
|---|---|---|
| **50%** | **15%** | **35%** |
| **less educated** | **average/ good education** | **well educated** |
| **not interested in learning;** | **instru-mental** | **interested in world;** |
| **TV for entertain-ment** | **low viewers** | **TV for learning;** |
| **enter-tainment** | **didactic** | **documen-tary/drama** |

## MAIN POINTS FROM CHAPTER

1. **Drop-out high for broadcasts without support services (tuition/texts)**

2. **Importance of reaching 80% + for credit-based courses**

    - **students won't watch if not necessary**

    - **designers will not include important material**

3. **Hence importance of quality of transmission times and repeats**

4. **In multi-media provision, TV needs to concentrate on what it does best (i.e. not lectures):**

   - **unique learning resources (e.g. experiments)**

   - **concrete to abstract**

5. **Importance of assessment policy: should relate to unique roles for TV (skills, not content)**

6. **Different styles of broadcast require different learning responses**

   **Documentary vs. illustrated lecture**

7. **Credit students have difficulties in using non-didactic programmes**

**Documentary-style TV**

**(e.g. foster parent)**

**Loose structure**

**Open-ended**

**Neutral**

**Self-standing**

**Valuable for developing higher-level skills of:**

| | |
|---|---|
| **interpretation** | **problem-solving** |
| **analysis** | **synthesis** |
| **application** | **evaluation** |
| **new insights** | |

**TV lends itself to *interpretation***

**Problems with 'open-ended' TV**

a. **role not articulated to students**

b. **often ineffective in meeting goals**

c. **Designers should ask: What kinds of learning are we trying to develop?**

## The one-third rule

**One third of students knew what to do and were able to do it. (As and Bs)**

**One third knew they were meant to analyse and interpret it, but were unable to do so.**

**One third did not know what they were supposed to do; thought programmes were a waste of time: low grades; instrumental in approach**

## How to develop skills from TV

**Need to help students use TV for higher level skills:**

1. **Within programmes: more direction to students (D102)**

2. **Use video-cassettes**

## Video-cassette ownership, 1986

| | 1986 | 1987 |
|---|---|---|
| UK homes | 52% | 60% |
| USA homes | 45% | 60% |
| OU homes | 60% | ? |

(not income related)

## The value of video-cassettes

Broadcast vs recorded TV

| Broadcast | Cassette |
|---|---|
| Fixed time to view | Available when needed |
| Ephemeral/once only | Repetition/search/mastery |
| Difficult to reflect | Analysis/relating/reflection |
| One speed | Individually paced |
| Integration more difficult | Integration easier |

## Student use of video-cassettes

**Do students stop, review, reflect?**

**Difficult if made as a broadcast**

**Designing video-cassettes to exploit control characteristics**

## Implications for programme design

a. Use of segments

b. Clear stopping points

c. Use of activities

d. Indexing

e. Close integration with other media (e.g. text, discussion)

f. Concentration on A/V

**How to develop skills from TV**
**(cont)**

3. **Use of audio-cassettes to discuss/analyse TV**

4. **Relate to assessment policy (and explain)**

**Responsibility of course designers**

## Implications

1. **A good proportion of 'credit' students are 'structured'**

2. **Higher education is about teaching students to think for themselves: moving students from structured to open**

3. **Television - more than other media - lends itself to this**

4. **But students need help**

## Main conclusions

1. **Television is an important, perhaps even necessary, ingredient of high-quality open and distance education, but only when it exploits fully its unique teaching characteristics.**

2. **The effectiveness of television depends to some extent on how the material is structured and to some extent on the technology available to the student.**

3. **Broadcasting is good for:**

    a. **Access to large numbers (more than 500 per course)**

    b. **Recruitment**

    c. **Raising awareness**

    d. **Comprehension of abstract ideas through real-life examples**

4. **Credit students require different approach than general viewers**

5. **Multiple-use should be considered: educational broadcasts for general public: same material restructured for credit students (perhaps on cassette)**

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